SUPPLEMENT.

The Mining Journal,

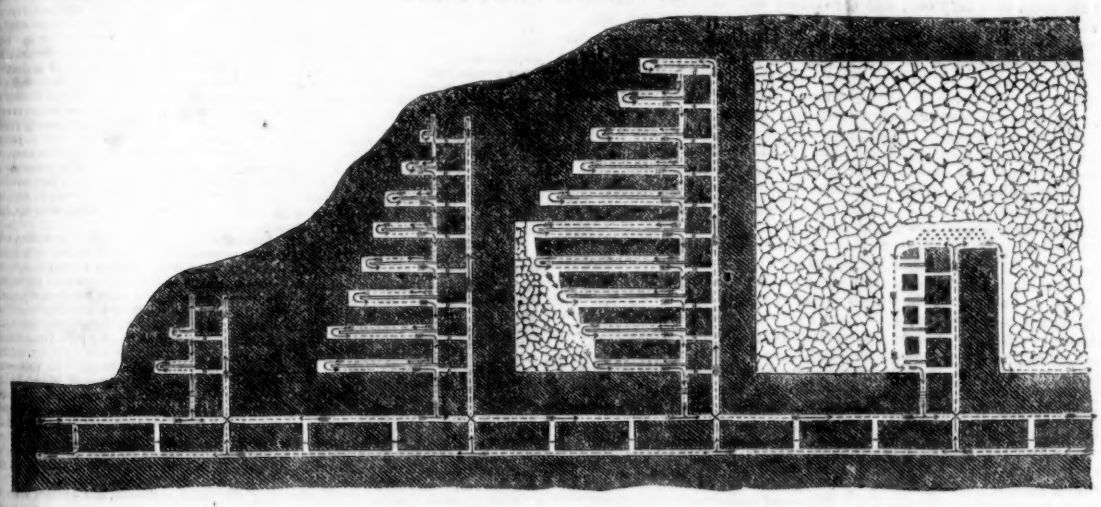
RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

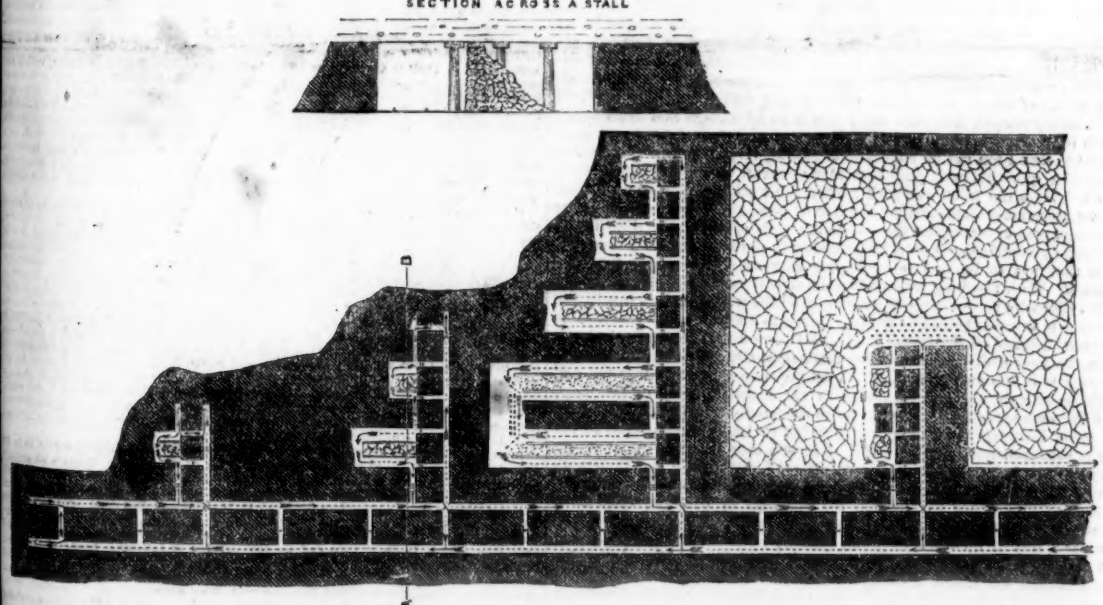
No. 1423.—Vol. XXXII.] LONDON, SATURDAY, NOVEMBER 29, 1862. [WITH JOURNAL] STAMPED.... SIXPENCE. UNSTAMPED. FIVEPENCE.

COLLIERY WORKINGS.

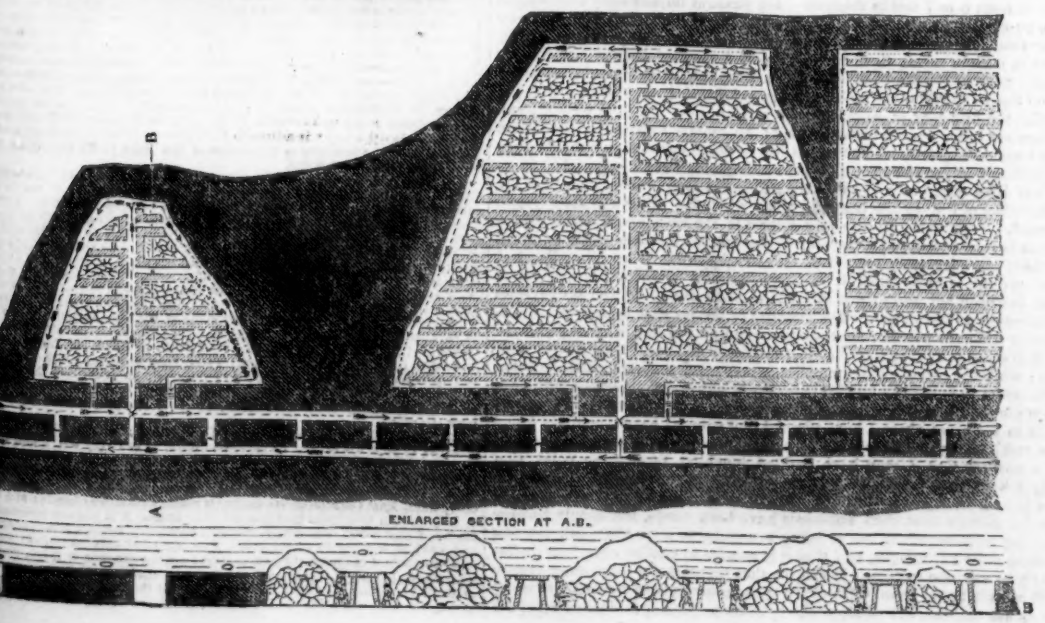
THE "PILLAR AND STALL," "DOUBLE STALL," AND "LONG WALL" SYSTEMS OF WORKING COAL, PRACTICALLY CONSIDERED.



SECTION ACROSS A STALL



ENLARGED SECTION AT A.B



ENLARGED SECTION AT A.B.

REFERENCE TO PLANS.

Air crossing.	Stoppings.
Regulator.	"Got" walls.
Doors.	The direction of the air current.

I promised some time ago in the columns of the *Mining Journal* to give my views of the advantages and disadvantages of the working of these systems in the Aberdare steam coal district, and for this purpose I have prepared the annexed plans and sections, to describe my ideas as clearly as possible to the public, who, I have no doubt, feel somewhat interested in this matter, which has been so frequently brought before them in the *Mining Journal*.

I will first take the "Pillar and Stall System," the ventilation of which will be seen by the annexed plan of the most perfect description. Every separate panel of bords or stalls has its separate current of air, which is carried first direct to the face of the heading, and back through each stall, as described, down and on through the regulator into the main return air-way, and on thus to the upcast shaft. The headings are usually driven about 8 feet wide, levels the same. The stalls or bords are from 6 to 8 yards wide, and if the roof be pretty strong the pillar between the stalls is of the same thickness that the stalls are in width—from 6 to 8 yards. So that when the collier has driven on his stall to the proper distance, he has the same quantity of coal to work back as he had in driving onwards, and this will be found quite enough in the face for the collier to carry down his coal to the tramway. If the roof should be so bad as to require stronger pillars between the stalls, it is usually taken away in two lifts, but the first described will be found to work best, as there is no second movement of the tramroad, and the roof is thus gradually let down before the collier. In driving stalls, headings, levels, or windways the collier has to put up all timber (excepting when the roof is so bad as to require what is called double timber over the roadways, for which he is paid at a fixed rate, and if he draws out any timber from the "goaf" in drawing back his pillar, he is paid for such timber so much per score); he has also to lay down all tramroads (excepting turns or partings) when driving on a stall or heading, and take up the same when drawing back his pillar; this work is all understood to be included in the cutting price per ton for the coal. In driving headings, levels, wind-ways, &c., the collier is paid so much per yard (according to the nature of the coal) for every yard driven more than the cutting price per ton. The price of yard work, of course, varies in the different seams, as well as the cutting price. It will be seen by this system of ventilation that ten or more stalls included in each panel are separate and distinct from all the rest of the workings, so that should an explosion occur in any one of these panels the other parts of the colliery would be secure from the effects of such explosion. The regulators should always be of good strength, and more particularly the air crossings, which should be made strong enough to resist the force of an explosion, for should one of these air crossings be blown out by the force of an explosion the air would, of course, turn direct into the return air-course, and thus all workings beyond left without air. There should always be kept on every colliery a good stock of brattice-cloth of the height of the different seams, so that should an explosion occur in any one panel, and all the doors at the mouth of the stalls be blown down, temporary doors could be quickly put up, and the air sent round the workings in its proper direction. This system of ventilation keeps all doors off the main levels and headings, and the distance for the air to travel is so much shortened that it is found, in practice, almost twice the quantity can be made to travel through the same area of wind-way, or return air-course. I give a section taken across a stall, to show how the air is carried on to the face of the stalls. The little brass and other rubbish found in the coal is built up in the form of a wall by the side of the tramroad, and all the small coal, dust, &c., thrown in behind it, which thus forms a good brattice, or partition, for carrying on the air as the stall advances. This also assists in supporting the roof, being placed near the middle of the stall. It will be seen by this system that repairs of roads, &c., is a very small item, as there is always a pillar of coal on one side of the roadway, and the headings have always a good pillar on each side, which keeps it strong, and, of course, requires little repairs; and by thus driving on the stalls, and then drawing back the pillar, the gas is more gradually liberated than when the coal is all taken away at once, as by the long wall. This system admits of a current of air being passed through every travelling road, and on the face of each working place, which keeps the parts on which the men are working free of all gas, and healthy.

"Double Stall System."—I will now take a system which is called in this district the double stall, of which I give a plan for its better explanation, and also a section, to show what in my opinion are its defects in a fiery district. This is a medium between the two systems—Stall and Pillar *v.* Long Wall,—but it admits the defects of one, and but few of the advantages of the other. It will be seen on reference to the annexed plan that the main levels and headings by this system are precisely the same as in the pillar and stall, and the system of ventilation is very much the same, but it has its faults, which I will describe. It will be seen by the plan that instead of having two separate stalls the coal between each consecutive stall is taken away, and the roadway kept on each side of the pillar; thus each roadway has a solid pillar on one side, and the air, it will be seen, only travels half the distance in passing through these stalls it would have in the pillar and stall system. The part I wish to point out as being defective is the distance between the two roadways in the stall being so great, and not sufficient rubbish found in the coal to fill it up, it necessarily falls, and cavities are formed in the roof, as shown by my section, which become reservoirs for the accumulation of gas; these quickly fill, and upon a second fall coming of, and on the sudden movement of the air by such fall, all the gas accumulated is suddenly thrown out into the travelling roads, amongst hauliers, door-boys, and colliers, which is exceedingly dangerous; and, besides, it must pass through all the travelling roads and working places below, until it gets into the return air-way. But if the gas did not accumulate as I have described, it frequently comes off by falls of the roof, and pucking or heaving of the bottom, in such large quantities that the whole of these places would soon be filled. This is the principal objection to this system. The next is the keeping up of the roof on the face of the coal between the two roads on the face of the stall, as it will be seen by referring to the plan. Should this fall up to the face of the coal, which it frequently does, the whole current of air in that panel is at once cut off. The road

ways, too, will be found worse to keep upon this system, as the roof always breaks between the two roads, and frequently extends on to the roads, and the bottom pucks or heaves, which makes the roads continually require repairing. This system also requires much more timber than the pillar and stall.

"THE LONG WALL SYSTEM."—I will now take the long wall system on the same seam of coal, and with a somewhat similar system of ventilation, the only difference being that you cannot pass the whole current of air through each separate roadway, but must allow a small scale on each door as the air passes up the main heading, until it arrives at the face; it is then brought back on the working face down to the main return air-course. Now, I think this a very objectionable system in fiery veins, as the gas will be continually (and in all parts) coming out into the tramroads. And on reference to the section on the annexed plan, it will be seen that it affords great facilities for the accumulation of large quantities of gas immediately behind and in the midst of the working-men; and also when sudden falls come off in any part you may rely on gas being forced out on to the workmen; but its coming out on to the travelling or horse-ways is worse than its coming in contact with the colliers, as their lights are generally standing, but when it comes in contact with the hauliers, door-boys, &c., who are continually running about from place to place, and not at all times over careful of their lamps, it is exceedingly dangerous, and open to serious objections, and I am afraid its more general adoption in fiery districts would be attended with serious results. The next objection to this system is the destruction of timber, the coal being all taken away at once; all gases confined in the roof act powerfully upon it at once, and break it much worse than when it is taken away by consecutive lifts, as in the pillar and stall system, and the roadways require continual repairs, both as regards the roof and the bottom. The latter will be found continually pucking or creeping, and the expense of keeping them in repair will be found a very heavy item in the cost-sheets of a colliery worked on this system; besides, there must be extra workmen employed at nights to draw out the back timber, and replace it nearer to the face of the coal. This cost, with the extra repairs of roads, &c., will be found generally more than equal to the cost of headings, windways, &c., in the pillar and stall system, and this system will require twice the quantity of timber that the pillar and stall requires under similar conditions. On reference to the section on the plan of this system, the different roadways will be seen to represent so many pillars of a bridge, or viaduct, from which the arches are turned, the goaf between each representing the span of such arch, and the falling of the roof very soon assumes the form of an arch, so that all the weight of the superincumbent strata is thrown upon the roadways, and hence the trouble of keeping them open. What engineer, I ask, would think of raising a structure upon such slight and uncertain foundations as the gob walls and timber on each side of the roadway represent? and these extend sometimes to 18 or 20, so that the weight thus thrown upon the roadways is almost incalculable in a seam similar to the Aberdare Four-feet, which is 6 feet high, of clean coal, and not yielding brass and other rubbish sufficient to build the gob walls on each side of the roadway, so that the falls between the roadways seldom make what is termed a close fall, or, in other words, the falling of the roof seldom fills all the space, which would thus take the weight of the roof, to a certain extent, off the roadway. On the contrary, you may creep all over the top of such falls for the whole length, and thus see that the whole weight (as I have described in the section) is thrown upon the roadway; and the open space on the top of such falls (unless a great amount of care is exercised) will be found continually full of gas, and liable at any time to be forced suddenly out into the travelling roads by falls, &c. This, I consider, a most unscientific method of working coal, and exceedingly dangerous in fiery districts, as described.

Aberystwith. J. NAYSMITH, Jun.

ON WORKING COAL.

THE "LONG WALL" *versus* "PILLAR AND STALL."

In consequence of so much having been said from time to time upon the relative merits of the two systems of working coal, I am induced to lay before you a few facts and observations, in as brief a form as is consistent with the importance of the subject under consideration. First remarking that all must be agreed of the importance of adopting the system that will admit of the greatest percentage of round or hand-filled coal, and the greatest yield per acre, whilst affording to the workman the greatest security from accident, and the capitalist from losing his property. To say that any one system possesses all these much-to-be-desired advantages, under all circumstances, is more than I dare affirm. That the long wall system possesses advantages over the pillar and stall under some circumstances is an indisputable fact; while, on the other hand, it is simply impossible to work some mines to advantage upon the long wall system, however skilfully the workings may be conducted. Perhaps the most important advantage in the long wall system is that all the coal may be worked out without the slightest waste; this cannot be said of any other system. If we take the loss to be 5 per cent. with the pillar and stall system, which is certainly below the mark, and call the mine rent 10d. per ton, it at once lessens the profit ½d. per ton, which upon 300 tons per day, or 93,600 tons per annum, yields the sum of 195*l.*, or a sum equal to that of a manager's salary in some instances. If the rent or royalty is only paid upon the quantity of coal sent to bank, as is sometimes the case, then the loss is removed from the lessee to the lessor; it, nevertheless, remains a loss. I need hardly observe that if only 5 per cent. is wasted in working the coal, it involves a loss to the capitalist of one-twentieth of the capital expended in sinking shafts, erecting machinery, &c. The loss from this source is a considerable item, where due attention and skill is directed to the working of coal upon the pillar and stall system, and only the minimum of 5 per cent. wasted in working. But if, as is often the case, the loss or waste exceeds 10 per cent., the loss must be ruinous to the capitalist. It can excite no wonder in the minds of those who have carefully considered the subject that collieries so worked should fail to answer the expectations of the proprietors; but this cannot fairly be charged to the system, but to the defective manner in which it is carried out.

If we consider this loss or waste in a national point of view, it will not be of much less importance to the whole community, or future generations, than it is to the proprietors of mines, who sustain a direct pecuniary loss; for though there may be no fear of the coal of the United Kingdom being exhausted for a couple of centuries, and in the meantime substitutes may be discovered that will lessen its consumption, and render the nation much less dependent upon it than at present, it, however, cannot have failed to have occured to all who have carefully considered the subject that before another century has passed over coal will not only be far more difficult to work, owing to the increased depth at which it will have to be wrought, but that some of our existing coal fields will have been worked out, and many others reduced to very narrow limits. The long wall system has produced a greater percentage of round coal, in every case that has come under my own observations than that of any other system; but the most striking advantage that I have seen is in the Three-quarters Mine, at Clayton Colliery. This mine was formerly worked upon the long wall system, but by some means it was discontinued, and for about twelve months it was worked upon a modification of the pillar and stall system, during which time the percentage of round coal was only 28. For six months subsequent to that period, and for six months previous, the percentage of round coal was over 85. I am quite aware that much difference exists in the same seam of coal within a very limited area, and that a much greater percentage of round coal may be produced from different parts of the same mine, with precisely the same system of working, and that this circumstance renders it somewhat difficult to arrive at a fair estimate of the difference of the two systems; but in the case referred to no such difference existed. In an experiment in the Roger Mine, Haughton, the difference in the yield of round coal was 4·75 per cent., being in favour of the long wall system. The experiment was fairly conducted, and extended over the working of 10,000 tons of coal. In this case the advantages were more than counterbalanced by the difficulty experienced in keeping good the wagon roads; and the long wall system was abandoned for a modification of the system. The Peacock Mine, Hyde Colliery, furnishes more favourable results than the Roger Mine, Haughton, in experiments sufficiently extensive to test the relative merits of the two systems. These are not the only mines wherein I have made direct experiments, but I have selected them simply because one furnishes us with an example most favourable to the long wall system, so far as producing a greater percentage of round coal, while the advantage from the same source in either of the other mines is such that it may easily be counterbalanced by disadvantages of another kind.

The mines referred to will, in all probability, be well known to most present, but as they are not always found in the same form, it may not be amiss to offer a brief description of them. The Three-quarters Mine varies from 20 in. to 2 ft. in thickness, and rests upon a floor containing many nodules of ironstone, which renders it somewhat difficult to hole or undermine the coal in the floor. The roof is a strong grey metal, suitable for walling or building packings with; the angle of inclination is about 20°. The Roger Mine is 4 ft. in thickness, and reposes upon a coarse fire-clay; the roof is a strong metal, with rock binds, but it is very irregular, sometimes being very difficult to keep from falling, and at others being one of the best of roofs. The angle of inclination is about 28°. The Peacock Mine is about 2 ft. 6 in. in thickness, and is one of the most fiery seams in the South Lancashire coal field. This mine is known in the neighbourhood of Oldham by the name of Bent Mine; it rests upon a floor composed of alternate layers of shale and thin seams of coal. The roof is composed of tender shale for about 18 in. in thickness, above which a strong dark-coloured metal is found. The roof of this mine, perhaps, contains more fossil flora than any other in the district. The angle of inclination is about 35°. In working the coal upon a properly-conducted system of long wall working, where the mine is adapted for such system, there can be little doubt but that the risk of accidents from falls of roof is materially lessened. In my own experience I have never had the slightest accident from such a source where the long wall system has been practised. We, however, ought not to overlook the fact that some mines are naturally more dangerous to work than others, and that the danger often increases in proportion as the thickness of the seam increases, assuming that all other circumstances remain the same, and that, as a rule, it is the thinnest seams that are worked upon the long wall system. The ventilation of a mine is far more simple in long wall working than in pillar and stall, besides which the health of the workmen is not so impaired by driving narrow or strait work, this being in a great measure dispensed with. To those familiar with practical mining, it must be evident that not only is greater physical power required in driving narrow work, but that the atmosphere of the mine is much less pure where the increased physical energies have to be brought forth. I have myself worked in places where the air has been so vitiated that it is now a matter of surprise to me how the constitution should have been able to have resisted such life-destroying agencies. I admit that an improvement has taken place of late in this respect, but it is yet no uncommon thing for men to work in a level or heading 40 or 50 yards beyond the point where the air circulates, and this, too, in an atmosphere sufficiently impure to produce the worst possible effect upon the constitutions of the most robust.

If the seam be a fiery one, and the colliery well regulated, a current of air will be conducted to the working faces by means of bratticing, but that can only be done at considerable cost and inconvenience, and must consequently be put down as an item against the pillar and stall system. I will not undertake to say in how many cases the safety-lamp is used as a substitute for ventilation in driving narrow work, but I may observe that if the health of the workman were considered the cases would be much less numerous than at present. Another advantage that I shall claim for the long wall system, before speaking upon the other side of the subject, is, perhaps, of more importance to those who, unfortunately, spend most or all of their capital in sinking shafts, erecting machinery, &c., than those already mentioned. It is the advantage of being able to dispense with the necessary large outlay consequent upon driving narrow work in a systematic manner preparatory to working back the pillars, and thus securing a return for the capital expended in the least possible time. I am quite aware that there are both managers and proprietors that do not wait for the levels or headings to be driven to the boundary before they begin to work out any coal that they may deem eligible, regardless of ulterior consequences, system, or order. I have seen many instances where this want of system has prevailed, but in no single case has it been attended with anything but ultimate disappointment and dissatisfaction to all concerned.

The North of England may be considered as the parent of the pillar and stall system, but it is now more or less used in almost every coal field in Great Britain, as well as upon the Continent. If it possessed no advantages over the long wall system, the mining engineers who adopt its use might reasonably be considered very prejudiced men. That epithet has been lavishly applied by some of the advocates of the long wall system, to those who continue the use of the pillar and stall system, forgetting that they lay themselves open to the very same charge, by adhering too rigidly to that which they believe to be the best. For my own part, I deem it best to carefully examine into every circumstance connected with a mine before adopting any system, and after so doing I will not say that I might not err in judgment. The pillar and stall system will admit of an almost unlimited quantity of coal being daily worked from the same area that would only admit of a very limited out-put if the long wall system were used. I need hardly remark that with many this is an advantage that must weigh much in favour of the pillar and stall system, although, for my own part, I confess that I am not an advocate for raising very large quantities where a smaller quantity, with judicious management, would produce a better profit. With the pillar and stall system the workings may be conducted to any reasonable distance upon the line of level, the only limits being the increased cost of conveying the coal to the pit's eye, and the difficulty of thoroughly ventilating the workings, owing to the increased drag or resistance that has to be met in conveying currents of air through long air-courses. With the long wall system the case is very different, for, owing to the difficulty and expense of keeping good the wagon and air-roads, the distance is practically limited in many mines to a few hundred yards. The greatest distance on the line of level that I have known to be worked out upon the long wall system is rather more than 800 yards, and in the case referred to it was very expensive to keep the wagon-roads so that the coal could be brought along them, owing to the constant creep of the floor, and the wagon-road rails having to be repeatedly taken up and lowered. In some instances the difficulty of keeping the main wagon-roads in order is increased from want of skill. I have a case at point where it was very difficult indeed to maintain a wagon-road, although it was little more than 100 yards in length, and at that point it became a question for serious consideration whether to abandon the workings or continue them upon some different principle. It was, however, ultimately arranged to try a few yards further upon the long wall system; but, instead of only working out 4 yards below the bottom wagon-road, to work out 15. After this slight change was made, it became practicable to carry the workings between 500 and 600 yards further, without experiencing more than ordinary difficulty in keeping the wagon-roads good. Where there are numerous faults it is difficult to work a mine to advantage upon the pillar and stall system, but it is still more difficult upon the long wall system. The pillar and stall system can be used under some circumstances where it would be almost impossible to work upon the long wall system. For instance, let us take a mine with which I am acquainted, and consider the possibility of working it to advantage upon the long wall system. The mine in question is from 6 to 7 feet in thickness; the stratum immediately overlying it is a strong sandstone rock, 23 yards in thickness. Only fancy the difficulty that would be experienced in obtaining material to build packings or walls with in such a mine; then consider what a slender chance any walling would have in resisting the superincumbent weight that would be forced upon the walls when the rock began to weight, and you will be enabled to realise the difficulty of working such a mine upon the long wall system. There are other cases wherein it would be equally difficult to work upon the long wall system. I know of at least a dozen mines that I should most unwillingly undertake to work upon such system were I required to do so. It has been urged as an objection against the long wall system that the subsidence of the surface is greater than when the pillar and stall system is used. I contend that the very reverse is the case, and that the subsidence is less, owing to the packing of the roof with strong walls, and that it takes place far more regular and less violent than when the pillar and stall system is used, unless it so happens that a far greater proportion of coal has been left unwrought in working upon the pillar and stall system than ought to have been. The quantity of timber that is used is not materially different whether the coal be worked on the long wall or pillar and stall system, providing equal skill is displayed in laying out the workings, &c.; while the cost of getting coal depends so much upon circumstances that it is unsafe to hazard an opinion in favour of either system, unless both have been employed in the same mine under very similar circumstances; and even in the cases where I have adopted that course I have sometimes found the result in favour of the pillar and stall system, and at others *vice versa*. It is possible that I may have omitted touching upon some points that might have been introduced into the subject with advantage; if so, it has not been from any desire to lay the matter before you in anything but a candid manner that such omissions have been made, but simply because nothing more occurs to me as being necessary to show that both systems possess their advantages, and that it is unwise to confine ourselves exclusively to any one system. It may be that occasionally some other system will answer better than either of the systems under consideration, for we by no means embrace the whole of the systems of getting coal when we speak of the pillar and stall and long wall, although many of the methods of working coal are but modifications of either one or the other of the systems spoken of.

JOSEPH GOODWIN.

REPORT ON CORNWALL AND DEVONSHIRE.

[FROM OUR CORRESPONDENT IN TRURO.]

In referring, in the Journal of Nov. 8, to the quite modern, but rapidly increasing, evil of mines being worked up by systematic puffing to exorbitant prices, I had not the least intention of being harder upon one instance of this than another. Although by no means unknown in West Cornwall, this evil has never there attained the proportions which it reached a few years ago in Devonshire, and in which it now especially flourishes in the Liskeard district: hence in dwelling upon it, one is naturally led to those eastern districts where it has reached its highest development.

At the best of times, except under very peculiar circumstances, mining is essentially speculative; but if in individual instances the chances of loss are always considerable, the profits in certain cases are so great that in good mining, in good districts, the balance of gain is always largely predominant. And as mines are held in shares, generally distributed pretty equally, the balance of profit is also generally distributed pretty equally among the class of prudent mining adventurers. In the case, however, of an interest in which great and sudden gains so often occur, it is only natural that many persons, instead of prudently distributing their stake among well-conducted mines, so as to be tolerably assured against loss, should be more inclined to risk heavy stakes on individual concerns, from which in case of success they may derive proportionate gains. This system of mining adventure is, of course, highly speculative, and generally results in the extremes of entire ruin, or in the realisation of great fortunes. A third form of mining speculation, which is most particularly characteristic of the metropolis, is that of speculating in *shares*, not for the purpose of holding them sufficiently long to get any result from the mine, but with the object of speculating on an immediate rise or fall. When this is done by time bargains we reach the highest gambling limits of which mining is susceptible.

Besides these three classes—prudent mining adventurers, who cautiously distribute their risk—the bolder speculator, who goes in for a great *coup*, incurring proportionate risks—and the mere share-jobber, who selects mining shares for the purpose of speculation, because they are more liable to violent fluctuations than any other class of securities—there is yet another class sprung up in recent times: that is, persons who put their money into a certain class of mining shares as an *investment* that shall pay a larger rate of interest than is usually procurable, but still one that shall not entail the risks attended with adventuring in speculative mines. It is in the interest of this class especially that my observations were made. Being generally people of moderate means, and without business habits, they particularly require to be protected and cautioned: the share-jobber and the ordinary mine speculator is generally perfectly well able to take care of himself—or at least thinks so.

Now, it is a fact that the mines in which this class of speculators invest—that is, good dividend mines—have during recent years, under a system born of London brokerdom, been really productive of a greater amount of loss than all the mining failures in the best districts of the county put together. When a mine makes a discovery which evidently must result in large profits, it is at once seized upon (if it can be got at) by the class of brokers who affect this class of operations. When they have procured a sufficient interest it, it is at once exalted into the position of a "sensation" mine. It is written on week after week, reported on, talked of, quoted, and hurried at the public in every possible form. Its great profits, which probably have attained their maximum, are stated to be merely a rivulet of the great stream of profits that is to come in the future. By arts, some worthy of the great Barnum himself, a widely-spread curiosity and demand is created on the part of the public; and as the supply of shares in any mine is very limited, compared with a demand thus created, prices are rapidly raised to at least double the intrinsic value of the concern. Clergymen and ladies, retired tradesmen, and the large classes in England with small savings or capital, are generally those who are the greatest sufferers. A copper mine, according to Cornish experience, has generally a run of its greatest profits for about three years. The profits of this period—the noonday of the mine—are represented as of certain continuance for years to come, on which the mine is worked up to 14 or 15 years' purchase, at which the public buy, and lose at least half the money invested.

Now, to those who are connected with mining as *mining*, and not share-selling, this is eminently distasteful, for it brings discredit on the pursuit, and consequently on them. Without affecting to have any particular sympathy with persons so weak as to be guided by the class of mine brokers in question, it is annoying to them that fine mines, which should be an honour to the county, are by these means made sources of loss and discredit. As there must be failures in mining adventure, surely the discredit and loss which they entail on the pursuit is enough to bear, without our greatest successes being manipulated so as to bring about the same result. I have before me now the statistics of some of the greatest mining successes of Cornwall during the last 20 years, and the total losses which this system of undue exaltation of prices has entailed in their case is really enough to make one ashamed to think of them. The cases of Wheal Baller, North Pool, and many others, will occur, even to the most uninitiated; where fine discoveries, which ought fairly to have been a source of profit to everyone who ever touched the mine, have by this brokerdom system entailed more loss, and broken up more families, than any equal number of ordinary mining failures we can mention. To lose by our best mines as well as our worst ones is burning the candle at both ends with a vengeance; and when such has been the case in such a large number of instances, are we surprised that most people are horrified at the very name of mining?

With regard to the case of East Caradon, the Caradon district, and eastern mines in general, I had not the least intention or desire of speaking disparagingly of any one of them, which those who pretend to think I did must know full well. I certainly stated—which is a fact so clear as to be beyond controversy—that the eastern mines have not those resources in depth which are characteristic of the greatest in the western districts, and without which half the mines in them must have been finally abandoned a generation ago. Like the eastern districts, they also had their great rich shallow bunches, workable at a trifling cost—taken away years ago;—but they also have, which the most extended trials of the last 25 years show the eastern districts *have not*, still deeper lying deposits of copper, and especially tin. The mines of the St. Austell district had shallow bunches of ore as rich, probably, as the old ores of Dolcoath or Cook's Kitchen; but the most persevering trials have failed in the former case to find the least indication of those deeper lying deposits, without which Dolcoath, Cook's Kitchen, Tincroft, Carn Brea, East Pool, South Crofty, North Roskear, Clifford Amalgamated, and numerous other western mines, would now present only ruined engine-houses and abandoned shafts. So that the data by which the value of mines is to be ascertained in the eastern and western districts are by no means precisely the same.

With regard to the special case of East Caradon, I could have still less desire to speak disparagingly of a mine which has been such a splendid success. To deny the value of such a concern would be as preposterous as to deny the value of a thousand pounds Bank of England note; but either may be bought too dear. Gold is a valuable commodity, but a man who gave 6*l.* an ounce for it would find himself a pretty considerable loser. The experience of the county, and above all of the eastern districts, is that no single mine of the same extent of sett has ever been found worth half the price paid for this mine under the effects of the recent broker-created excitement. A man who protests against East Caradons at 55*l.* a share—to return which with ordinary interest to purchasers the mine must yield the unparalleled sum of nearly 600,000*l.* profits—no more denies the intrinsic value of the property at a fair price, than he could be properly said to have denied the value of the London and North Western Railway because he had protested against the stock going, as it did during the late railway mania, to 245*l.* A men who said so at the time would, probably, have been called an enemy to railways; but bitter experience has shown that there is no enemy so disastrous to any interest as those who, for share-selling purposes, exalt it to prices so completely beyond its intrinsic value that a terrible collapse is inevitable.

As a comparison between East Caradon and its eastern neighbours seems to be for some reason horribly unpalatable to its *claqueurs*, as an attempt to draw an analogy between it and any one of the five entirely distinct mines which make up Devon Consols seems to affect them much in the same way as a red cloth does an angry bull, let us humour them with a comparison between their mine and the most successful copper mines of modern times, in the best district of West Cornwall, although in doing so I by no means admit the soundness of the analogy. West Seton, on one of the richest runs of lodes ever known in the county, and on the parallel of Dolcoath, South Roskear, and North Roskear, must surely be admitted, so far as position goes, to be as well situated as a neighbour of Tokenbury or South Caradon Wheal Hooper. Let us, then, see what results from a comparison of East Caradon with West Seton.

West Seton, in 400 shares, worked for seven or eight years making calls, a period of incubation, however, far less than that of East Caradon. In 1854 dividends commenced, which reached their highest pitch in 1860 and 1861, during which two years the mine divided 50,800*l.*, or at the rate of 25,400*l.* a year—more by 1000*l.* a year than the rate of profit now dividing at East Caradon. Yet the highest price which West Seton shares ever attained was about 420*l.* per share, or 168,000*l.* for the mine—less than one-half of the price at which East Caradon was recently selling. Why one mine, situated in the very best district in Cornwall, paying 25,400*l.* a year, should sell for 168,000*l.*, while another mine, situated in a district which although good is one of very inferior resources, and only paying profits at the rate of 24,576*l.* a year, should sell for 337,920*l.*, is one of those inscrutable phenomena which are quite beyond the depth of my comprehension. If the converse had been the case—if West Seton sold for double the price of an eastern mine making similar profits, there might be some reason in it. And a further examination will show still more how unreasonable have been the recent prices of East Caradon; for experience has proved that West Seton, although paying more profits, and while selling at less than half the price of East Caradon, really sold too dear—as many who bought shares at tip top prices have learnt to their cost. This loss would be still greater, for West Setons would not even maintain their present price were it not for the well-grounded confidence inspired by the experience of the district of the resources of the mine in depth, which no concern in the Caradon district can ever pretend to hope for. A comparison of the details of the nature of the lodes in the two mines would be still more in favour of West Seton.

One of the most energetic *fauteurs* and supporters of the extravagant prices of East Caradon is injudicious enough, in his excess of zeal, to speak of the value of ends as against market operations as influencing the true value of this mine. There never was a more unhappy reference. Let us look at the figures: the most liberal valuation of the ends at East Caradon would not bring their total produce to more than 12 tons per fm. At West Seton, which at present has no pretension to be a rich mine, the ends turn out an aggregate of 19 tons per fm.; let us say half as much again as East Caradon. If the value of a mine is to be deduced from that of its ends—if East Caradon is worth 337,920*l.*, West Seton should be worth 507,000*l.*, or 1267*l.* per share—that is, it is now selling at more than 1000*l.* per share too cheap. Applying the same criterion to Devon Consols, where, according to the last report, the value of the ends amounts in the aggregate to 74 tons per fathom—that is, more than six times the aggregate value of the ends in East Caradon—these mines should sell for 2,027,520*l.*, or 1980*l.* per share; that is, they are more than 1500*l.* per share too cheap. I have tried the thing under every possible form, and under no circumstances can I avoid the dilemma—that East Caradons have been selling enormously too dear, or that all the leading mines of the county are selling at prices preposterously below their value, which is generally considered to be rather far from the case.

There are various other points I could dwell upon, but really I have no wish unnecessarily to push the case to its extreme limits. I can very well afford to smile at the contemptible insinuations of a clique of mine sharebrokers, who, guaging others by themselves, can never imagine anyone to be actuated by other than the lowest of motives. It was as far from my imagination to suppose that which I wrote would seriously affect East Caradon shares as that it would send down Consols; and I am not vain or silly enough to suppose that it could have done so if it had not possessed the force of truth. I was well aware how desperately interested many are in maintaining prices, and was also well aware of the storm I should inevitably encounter; but I have been long determined to attack the system, and I am not the man to flinch from doing so in its greatest stronghold. If the price of shares cannot be maintained by the force of money or the force of reason, I doubt, however, whether the purpose can be effected by swaggering and bullying. The scene of violence, horrible threats, and foul language, of which

East Caradon was witness on Nov. 21, is happily, like the price of the shares, hitherto without parallel in Cornish mining. When a party, including two of the leading mine managers of West Cornwall—Capt. William Roberts, of West Basset, and Capt. Joseph Jewell, of South Tolgus—went to inspect the mine on that day, they not only found the water in the bottom levels—which may have been unavoidable—but they were subject to treatment odious for its insolence. A person in authority on the mine insulted not merely this party, but other shareholders, including the City Editor of one of the London daily papers, by volleys of oaths and threats such as are, happily, now unknown above the lowest dregs of society. In any respectable mine in West Cornwall no man capable of using such language would be allowed to occupy the meanest position for an hour; and this is a matter which certainly cannot be allowed to rest where it is. It is characteristic, however, as showing the desperate expedients resorted to to bolster up a failing market, and shows, more than anything else can, the true character of the persons engaged in this endeavour.

FOREIGN MINING AND METALLURGY.

The extremely low prices at which several contracts for rails have recently been concluded in Belgium have had the effect of attracting some further orders to that country during the last few days. Several important deliveries have been proposed to leading houses, and some have been accepted; among others, one for 2000 tons for the Northern of Spain Railway, and 5000 tons for the Medina del Campo and Zamora Railway, another Spanish undertaking, which is endeavouring to issue 10,000 obligations—corresponding to English preference shares and debentures—of 20*l.* each. These obligations are to be issued at a minimum of 9*l.* 4*s.* each and upwards, and will be repayable at par—that is, at 20*l.* each—by the replacement being effected by lot, and an annual interest of 12*s.* being payable on each obligation until it is drawn for payment. These securities are in much favour in Belgium, and the facility with which they have been taken up affords an explanation, to some extent, of the readiness with which Belgian houses have received orders from foreign railway companies. At present the greater part of Belgian establishments have work on hand for some time, and prices are hardening accordingly. Belgian forged iron is very nearly able to compete advantageously with that of England, and, if it were not for the superior means of transport possessed by their English opponents, Belgian firms do not hesitate to express their belief that they would hold their own still better on foreign markets. As a proof of this, the result of the recent adjudication of 5000 tons of rails for Mexico—which terminated in favour of Messrs. E. Blount and Co., of Paris, the amount of whose tender was 8*l.* 12*s.* per ton, and who will forth their contract in Wales—is cited. MM. de Dorlodot Frères competed in this adjudication, and their offer was only 8*s.* per ton in excess of the minimum reached by Messrs. Blount and Co., while their price was notably below that of other English ironmasters. It is inferred from this that it was the expense of transport to Mexico which settled the business, the charge under that head being more onerous from Belgian than from England. Since a brevet which existed with reference to the manufacture of girders was recently annulled, the fabrication has assumed a great development, all the establishments of Charleroi, the Centre, and Liége having organised arrangements for producing this description of irons, the employment of which becomes every day more considerable. Girders of the first class are being dealt in at 7*l.* 4*s.*, second class at 8*l.* 8*s.*, third class at 10*l.* 8*s.*, and fourth class at 11*l.* 12*s.* Belgian forges are delivering all the ironwork employed in the new Opera at Paris and the terminus of the Northern of France Railway. These deliveries are calculated by thousands of tons. At Liége, 16 blast furnaces are in activity; their production is almost entirely consumed in the surrounding district, as the outlet of the Zollverein, which had a few years since a great importance, scarcely exists now, except by way of recollection. White refined pig has been quoted at 5*l.*, grey at 3*l.* 8*s.*, and casting pig at 3*l.* 16*s.* up to 4*l.* 8*s.*, according to numbers. For the last year the scoriæ of ancient Catalan forges, known in the Charleroi district under the name of "sarrazin" have been employed on a large scale. These matters contain 40 per cent. of iron, but only yield an iron of secondary quality. The forges, which treat sarrazin scoriæ, or the refuse of wood forges, buy also at the rolling works scoriæ obtained from working pig with coal. The price paid for this last description of refuse is 4*s.* 2*d.* per ton, delivered at the nearest railway station. A furnace, constructed on the plan of one in Wales, is about to be erected at Charleroi, for the purpose of treating forges scoriæ on a large scale for the production of pig for rails. It is the impoverishment of the mineral bearings of Belgium which has caused the ironmasters of the kingdom to direct their attention so closely to scoriæ. With regard to the Belgian coal trade, it is reported that freights to Paris have a decided tendency to fall; the charge of 8*s.* from Charleroi to La Villette is no longer consented to by forwarders of coal, who await new reductions, which are all the more probable as winter stocks have been, to a great extent, laid in, and boat proprietors will, consequently, have some difficulty in obtaining freights. At Liége there has been some little activity in the local coal trade, and stocks heaped up at the pits' mouths begin to disappear. For the last week or two the deliveries have been so active in the basin of the Centre that it has been necessary to have recourse to all possible means of transport. The railway of the Centre has been forwarding daily—as well for Erquelines as for Ecaussines—more than 250 trucks; and on the State Railway there has been a daily movement of more than 600 trucks. The coal proprietors have shown themselves well satisfied with the manner in which the train service has been conducted on the various lines so as to meet their requirements. Unhappily, the same cannot be said of the coal workers of the Charleroi district, who, after having loudly complained of the Northern of France Railway, have now been for some time attacking the East Belgian. The stock of coal in the Borinage was estimated, on the 1st inst., at 176,671 tons—viz., 73,760 tons of Flénu, 92,483 tons of half-rich, and 10,428 tons of rich. The miners have resumed work in all the pits of the basin, but deliveries have been checked by the want of boats. It is estimated that the deliveries from the Couchant de Mons during the first ten months of 1862 amounted to 1,250,000 tons, while in the corresponding period of 1861 they attained a total of 1,430,000 tons.

Some journals affect to be moved to pity from time to time by the unhappy fate of the metallurgical establishments of the French department of the Nord, depict them as in a sad commercial position, and express surprise that they have not entirely ceased to exist. It is difficult to guess what can be the utility of the views expressed by these alarmists, but one fact is certain—that they bring depreciation and discredit on a group of industrial establishments, which are, on the whole, experiencing a fair degree of prosperity. Thus the works grouped about the environs of Maubeuge employ Belgian minerals, which are completely exempted from export duties, while for combustibles they use the coke of Mons, which is brought to them at very low prices by the line of railway from Mons to Hautmont. The raw materials consumed at these furnaces cost, then, about the same amount as at Charleroi, plus transport expenses, which, all things taken into account, do not represent more than 12*s.* per ton. The introduction of Belgian pig into France being burthened with a duty of 1*l.* per ton, it follows that the works of the Maubeuge district are gainers to the extent of 8*s.* per ton as compared with their Belgian competitors. Then, again, with regard to the fabrication of iron, a productive duty of 2*l.* 16*s.* per ton exists in favour of the French ironmaster; and if his rolling-works are associated with blast-furnaces he has first of all the profit just calculated on pig. Even admitting that he employs Belgian pig, he would only pay on the 1 ton 6 cwts. of pig acquired for the production of 1 ton of iron, customs' duties to the extent of 1*l.* 6*s.* per ton. The expenses attending the transport of combustible would probably involve an additional charge of 3*s.*; and the cost of rolled iron would, consequently, be 1*l.* 14*s.* per ton higher at Maubeuge than at Charleroi; but as Belgian iron, as before stated, must pay a duty of 2*l.* 16*s.* per ton on entering France, there would still remain a nett profit of 1*l.* 2*s.* per ton in favour of French works. These, it is affirmed, are not theoretical arguments, but facts which it would be difficult to refute, and the commercial consequences of which are abundantly evident. While at Charleroi works must make great sacrifices in order to maintain a moderate degree of activity in their production, the Maubeuge establishments are in full activity. The blast-furnaces of the Nord, the Providence works at Hautmont, the blast-furnaces of Aulnoye, &c., are thus fully engaged; the conditions of production appear so favourable that Belgian "industrials" are willing to embark capital on the French side of the frontier; and, independently of the rolling works of the Sambre, at Bois-le-Tilleul, which are about to be set to work, a blast-furnace at Trelon is also to be re-lighted.

There has been some feebleness in copper in the Paris market; English has been quoted 98*l.* 8*s.* to 99*l.*, Lake Superior 107*l.*, and Chilian 91*l.* At Havre, Chilian has remained neglected, large supplies having reached the market; on the other hand, parcels of Lake Superior are well held, and about 70 tons have found purchasers at 104*l.* At Hamburg the demand has been limited, and the smallness of the quantity on offer is the principal cause which enables holders to maintain fully former rates; 10,000 livres Roraas, recently imported from Trontheim, and 30,000 livres Hockansboda have been offered. Cologne has been calm, without variation, and Berlin has been very firm. Advices from Valparaiso state, with regard to Chilian, that several furnaces have ceased working in consequence of the recent depreciation of the article, although low prices for coals were rather encouraging to founders. At Rotterdam and Amsterdam the market for tin has been calm; and at Paris, without much business, Banca remains at 124*l.*, Detroit at 121*l.*, and English at 118*l.* The Hamburg market has been better sustained, although purchases have only been made to meet consumptive wants. Cologne and Berlin have been more feeble. The latest report with respect to the Paris lead market quotes rough French at 21*l.* 16*s.* to 22*l.*, and Spanish at 22*l.* 4*s.* Stolberg has maintained its price at Rotterdam; Cologne has been quiet. The advices from America received at Berlin have encouraged holders to maintain high prices, and several important transactions have taken place. The Hamburg market has become calm; the great outlet for the article appears closed for the season, and stocks on the spot are very much reduced. In small purchases to meet consumptive wants full prices have been paid; a lot of 40,000 livres of argentiferous lead has been imported from Motamoras for this market. Rough zinc remains very calm at Paris at 18*l.* 16*s.* to 19*l.*, and at Hamburg prices have continued unchanged; in fact, they have been almost nominal, in consequence of the absence of a good demand. The Belgian market has also been quiet, and in the other secondary markets there has been no change to mention, prices having been generally nominal.

Scarcely three years since the construction was commenced in the meadows of the Senne, at the gates of Brussels, of buildings intended to be used as workshops for the construction of machinery and railway plant. These works were built for a partnership founded by Messrs. F. Fourcault and Charles Evrard, the concern being directed by the last-named gentleman. Very shortly afterwards the extension of the business of the partners rendered it necessary to create another establishment belonging to them, and situated at La Croyère, in the commune of St. Vaast, near the railway from Mons to Manage. The partnership is now to be transformed into a full-blown company (we beg pardon for using such an irreverent, although expressive, epithet), under the style and title of the "Belgian Company for the Construction of Machinery and Railway Plant," and the capital is set down at 1,400,000*l.* Of this sum, 64,000*l.* refers to the works transferred from the previous partnership, together with their plant, stores, orders in course of execution, orders on hand, &c. The remainder of the capital, 56,000*l.*, is offered for public subscription, under the patronage of the commercial bank of Messrs. Delloye, Tiberghien, and Co. The statutes of the new company have just received official "homologation," or approval, and, as the affairs are in good hands, it appears to have a hopeful future before it. There is already an establishment in Belgium which has acquired so rapid a development. The Charleroi Blast-Furnaces, Ironworks, and Collieries Company is also about to raise additional capital, by an issue of 2000 obligations, of 20*l.* each, bearing an annual interest of 1*l.* The obligations are offered to the public at 11*l.* 8*s.* each, and are repayable at par each, by drawings extended over 90 years. The directors of the company carry on the blast-furnaces, forges, and steel works for marine and railway purposes, under the management of Messrs. Petin, Gaudet, and Co., have declared a dividend of 4*l.* per share for the exercise of 1861–1862, of which 1*l.* 12*s.* is now in course of payment. The Asturias (Franco-Spanish) Coal Mining and Metallurgical Company cannot at present afford its shareholders a dividend, besides the half-yearly interest at the rate of 5 per cent. per annum would be accepted as a good dividend, and no further proposition would be asked; but on the Continent a distribution is not called a dividend, unless 5 per cent. has been previously paid as "interest"—a very salutary rule, if it can be duly adhered to and developed.

Meetings of Mining Companies.

BRYNAMBOR MINING COMPANY.

An ordinary general meeting of shareholders was held at the company's office, Great St. Helen's, on Monday, Mr. E. Edwards, C.E., in the chair.

Mr. J. Gregory (the secretary) having read the notice convening the meeting, the minutes of the last were confirmed.

A statement of accounts, made up to the end of August, was submitted, which showed a credit balance of 89*l.* 0*s.* 2*d.* (including 62*l.* 7*s.* arrears of last call).

The report of the agent (Capt. E. Williams), was read, which stated that since the last general meeting their progress had been rather slow in the underground operations, but the 20 fm. level west was in a very promising lode, composed of fluor spar and lime; the ground was hard and wet, and yielding saving work for lead ore, and he expected a further improvement every hour. The 20 fm. level east had been driven only 1 fm. since the last meeting, and the end was now in a most promising lode, and would yield about 8 cwts. of lead ore per fathom—this level had gone through a course of ore that would yield upwards of 1 ton of ore per fathom. The stopes in the back of this level, east and west of the winze, were looking well, and would yield, for the full width of the lode, 15 cwts. of ore per cubic fathom. In the surface operations great progress had been made; a drawing-machine had been erected, and connected to the 12 ft. waterwheel, and a water-course made from the river to the mine. The crusher was upon the mine, and a tramroad had been made from the upper to the lower dressing-floors. Upon the whole, the mine was looking well, and would turn out profitable, if carried out systematically.

The Chairman said that, by the report just read, it was seen that since the last meeting the attention of their agent had been directed to the completion of the various works at surface, by which the property could be economically and efficiently developed. He could not, however, refrain from remarking that the operations at the mine had been somewhat retarded from the directors not having had a small working capital at their command. As his colleagues upon the board, as well as himself, were large shareholders, he need hardly say that they were unwilling to make a call for any amount beyond that positively required, as an evidence of which he might state that, although the directors, by virtue of the Act under which the company was incorporated, had in themselves the power to make calls, they declined to exercise their prerogative, preferring to submit to their co-proprietors the actual position of the company's affairs, and to leave it for them to decide the amount of call to be made. Even the most uninitiated in mining matters were aware that, however valuable a mine might be, a certain amount of capital must be expended to bring the property into a working condition—that, he might say, had been done at Brynambor, and all that was now required was a small amount of capital to enable the agent to make such returns as it was hoped would leave a good profit to the proprietors. Before concluding, he might inform the meeting that 10 tons of ore (computed) had been sold for 13*l.* 6*s.* per ton. As their consulting engineer (Mr. Matthew Francis) was present, proprietors might obtain any information required, both as to the present and prospective value of the property.

Mr. M. Francis stated that he had visited the mine since the erection of the machinery had been commenced, and there was no reason to doubt that as soon as it was completed they would be able to avail themselves of the value of the lode, and make regular monthly returns. While their machinery was imperfect, large returns could not be expected, but when their drawing, pumping, and crushing appliances were in an efficient working condition (which would be the case in about a fortnight), the Brynambor could be worked in the same systematic and economical manner as the other mines in the district. Looking at the state of the underground workings, it appeared that the ore, even at the present depth, would leave a fair margin of profit; but what was required was a little fund in hand, so as to meet with regularity the different expenses at the mine, for their future prosperity and success depended upon the regularity with which the working was conducted. At the present time they were only in a transitory state—moving from one state in which it was impossible to make profits into another which would enable them to make large returns and proportionate profits.

The Chairman enquired if the mine was looking as encouraging as it did recently?

Mr. Francis replied that the mine was looking more encouraging, inasmuch as the ore ground was holding further east and west of the discovery than was anticipated, and there was no doubt that at deeper levels still more satisfactory results would be realised. Enough had already been seen to satisfy him that it was not a transitory course of ore—there was no question that it was a very extensive deposit of ore, and one that would leave profits.

After some further discussion, during which the Secretary explained that the auditor had been unavoidably compelled to leave town, and that, therefore, the accounts had not been audited, it was resolved that the report and balance-sheet be received and adopted, subject to the balance-sheet being passed by the auditor.

Mr. Coleman enquired if the company's consulting engineer would furnish a detailed report of the position of the property after his next inspection? That report would be of the greater importance, seeing that the machinery would be completed.

Mr. M. Francis said it would afford him the greatest pleasure to accede in every way to the request of the hon. proprietor. He might, perhaps, mention that the machinery now being erected was quite capable of developing the mine to a depth of 250 fms.

A call of 1*s.* per share was made.

A vote of thanks to the Chairman terminated the proceedings.

NORTH MINERA MINING COMPANY.

An ordinary general meeting of proprietors was held at the offices of the company, Crown-court, Threadneedle street, on Tuesday,

Mr. T. P. Thomas (managing director) in the chair.

Mr. C. W. W. Thomas (the secretary) read the notice convening the meeting, and the minutes of the last were read and confirmed.

A statement of accounts was submitted, which showed—

Balance from last account					£	2	15 0
Lead ore sold to Walker, Parker, and Co.	£149	18	0				
Less royalty	13	14	0=	136	4	0	
5000 new shares	2000	0	0				
Less unpaid	412	0	0=	1588	0	0	
Received on call account				194	2	6=	£1921 1 6
July cost				£196	0	0	
August ditto				147	18	3	
September ditto				151	14	5	
October ditto				184	16	5	
Merchants' bills				242	12	7	
T. P. Thomas				558	0	0	
Secretary's salary				40	0	0	
Sundries				17	18	0=	1538 19 8
Leaving balance							£ 382 1 10

ASSETS.

Balance brought down	£382	1	10	
Due on capital account	412	0	0	
Due on call	160	15	0	
Deep Level Company	168	7	7	
Trimley Hall Company	16	2	7	
Cwmbrane Company	7	12	6	
40 tons lead dressed	500	0	0	
10 tons lead in course of dressing	120	0	0	
Value of machinery, &c.	2100	0	0=	£3866 19 6

LIABILITIES.

Royalty unpaid	£169	5	8	
Secretary's salary	117	10	0	
Managers' ditto	60	8	0	
Directors' fees	94	10	0	
T. P. Thomas	87	0	5	
Merchants' bills	86	6	4	
Sundry ditto	54	3	0=	660 17 5
Leaving balance				£3207 16 1

The report of the manager was read, as follows:—

Nov. 25.—Since our last meeting we have thoroughly timbered and secured the mine throughout, and put in air-pipes in the 15 fm. level, west of the eastern shaft, which has been attended with considerable expense. We have also directed our attention to driving the 45 yard level, east of Pugh's, and the 15 fm. level, west of eastern shaft, in order to communicate the two workings, and we hope to make the communication next week. Upon this being completed, we hope to increase our returns very materially, and we shall be enabled to work the ground 20 per cent. cheaper than we have hitherto done. With regard to the appearance of the mine, it gives me pleasure to be able to inform you that, on the whole, the mine never looked so well as at the present time. The 45 yard level is a little disordered by a cross lode, and not so productive for lead; but there is no fear whatever of its again becoming productive as we drive east. The counter lode is greatly improved, and is worth from 35*l.* to 40*l.* per fm. for the part we are driving on, which is not more than one-fourth of the width of the lode. The lode both east and west of the eastern shaft is also much improved, and producing together about 45*l.* worth of ore per fathom. The stope in the back of the 45 yard level is worth about 25*l.* per fm. It will be seen by the accounts that the cost for the last three months has been under 500*l.*, and during that period we have broken about 50 tons of ore, 40 tons of which are now dressed, mixed, and ready for sale, and as our miners have been idle about four weeks of the time, our workings have been attended with more favourable results than anticipated. I have fully carried out my promises as to reduction of cost of working, and I have no doubt that from this time I shall be able at our successive meetings to lay before you the account of increased returns.

The report of the captain was as follows:—

Nov. 24.—In the 45 yard level, east of engine-shaft, the ground is favourable for progress, and producing a little ore. The stope in the back of the 45 will produce about 2 tons of lead ore per fm. The counter lode is looking rather better than when last reported on, the lode making through the beds below; it is at present worth about 34*l.* per fm. The 15, west of eastern shaft, is progressing favourably, and producing a little lead. The stope in the back of the 15 west has rather improved since last reported on, it being worth about 22*l.* per fathom. The counter lode, north-east of eastern shaft, is worth about 4*l.* per fathom, and looking kindly for further improvement. The stope in the back of the 15, east of eastern shaft, is worth from 15*l.* to 18*l.* per fm. According to our calculation we have about 9 ft. to drive before communicating the 45 yard and 15 fm. levels, and we expect to accomplish it next week.

The Chairman said it afforded him peculiar pleasure to meet the proprietors upon the present occasion, for it had never been his privilege to preside over a meeting of the North Minera Company under such peculiarly favourable auspices, both as regarded the financial and the commercial position of the undertaking. With respect to its position financially, it had been seen by the accounts just read that there was at the bankers a credit balance of 382*l.*, and that there were 500*l.* or 600*l.* yet to be received. In addition to this, there were 50 tons of lead ore at surface, 40 of which were ready for immediate sale. Therefore, the actual available assets amounted to something like 1400*l.* or 1500*l.*; and with respect to the position of the company commercially, all he could say was that the eastern and western workings would be communicated in about a week from the present time, as that would not only thoroughly ventilate the property, and enable to more thoroughly and vigorously develope it, but, at the same time, it would enable them to conduct their operations with a further saving of, at least, 20 per cent. In short, the undertaking was now just in that position that he (the Chairman) predicted it would be upon the issue of new capital. From the present time they might date the commencement of profitable operations—they were independent of everybody; by paying ready money for every article supplied discounts would be saved, so that there would now be nothing to meet but the costs, which would, he hoped and believed, result in the production of permanent and increasing returns. It would be probably in the recollection of proprietors that the two agents who were some time since appointed to inspect and report upon the condition of the mine estimated the costs would be 200*l.* per month, and that the returns would be (according to the estimate of one) 14 tons, and (according to the other) 16 tons per month. Now, the fact was the costs had been for the three months about 500*l.*, and the returns had amounted to 50 tons—instead, therefore, of the quarter's operations resulting in a loss there had been an actual profit of about 100*l.* The item in the accounts of 240*l* for merchants' bills formed part of the old liability, for all merchants' bills contracted since had been paid. The amount paid to him (the Chairman) was in re-payment of advances he had made from time to time, in liquidation of the merchants' accounts—hence the costs for the quarter, including merchants' bills, had been considerably less than 500*l.* He was not aware that the whole of the proprietors were cognisant of the fact that, thanks to the liberality of the Marquis of Westminster, the royalty had been reduced from 1*l.* to 15*s.*, not only upon the future returns, but upon all returns made from the time when the application was made for a reduction. In conclusion, he had the gratification of stating that never since North Minera had been a mine had its position been so satisfactory or its prospects so encouraging. (Hear, hear.)

Mr. Milford reminded the meeting that since the last meeting they had paid many of the outstanding liabilities.

Mr. Bartram called attention to the remnant of the old call remaining unpaid.

The Chairman said that matter was at present in the hands of the company's solicitor.

Mr. T. E. W. Thomas said that, although the statement of accounts showed a balance of 382*l.*, that was really only the cash balance in the hands of the bankers; but if proprietors would examine the balance-sheet for themselves, it would be seen that, after deducting every asset not available, there would be left about 1100*l.* of available capital.

The Chairman said, looking at the improvement in the caunter, and at the productiveness of the lode in the eastern shaft, where there was a fine course of ore worth 30*l.* per fm. coming in below the beds of shale, he thought they had good reason to hope that North Minera would prove to be one of the richest mines in the district. He did not mean to say it would become suddenly as rich as the world-famed Minera, but he had not the least doubt but that in time to come North Minera would successfully vie, both in permanence and productiveness, with its rich neighbour, for the latter, at the present depth of North Minera, was not half as rich.

Mr. Bartram said, some two months since he went through the whole of the underground workings; and he had much pleasure in stating that the mine was now in a thorough and efficient state of working, and that, so far as he was able to judge (for he took fine specimens of lead out of each level), the prospects of success were encouraging.

The Chairman, in answer to a question, said he believed as the depth was increased the "shales" would have very little effect upon the productiveness of the bunches of ore.

Mr. T. E. W. Thomas stated that some 12 months since the monthly costs were between 400*l.* and 500*l.*—at that time there were several points being operated upon which were not producing ore; but the costs had now been reduced to about 150*l.* per month, and larger returns were already being made, and would be still further increased when the communication was effected between the eastern and western workings. Of course, the decreased cost and increased returns had mainly arisen from an improved productiveness of the lode.

A Proprietor enquired if the Chairman had any information to communicate with regard to the supposed existence of coal in the company's property?

The Chairman said at present he had nothing further to communicate. From the shaft now being sunk for the development of their lead lode, they would be able to put out cross-cuts, and thus determine as to the existence of coal at a very much less cost than if they were to sink from the surface with the express object of "finding" coal.

Upon the proposition of Mr. Bartram, seconded by Mr. Milford, the reports and accounts were received and adopted.

A unanimous vote of thanks was passed to the Chairman for his continued and successful attention to the working of the mine, and also for the courteous manner in which he had presided over the meeting.

The Chairman having acknowledged the compliment in appropriate terms, the proceedings terminated.

EAST KONGSBERG NATIVE SILVER MINING COMPANY OF NORWAY.

The third ordinary general meeting of proprietors was held at the company's offices, Austinfriars, on Wednesday,—Mr. W. B. M. Lysley in the chair.

Mr. R. S. Parker (the secretary) read the notice convening the meeting, and the minutes of the last were confirmed.

The report of the directors stated that upon the present occasion they had the satisfaction of announcing to the shareholders that the company's manager at the mines had reported to them that on Oct. 26 last the stamps were completed, and were now working night and day. The shareholders were aware that there was a considerable quantity of ore of various qualities assorted, and ready for stamping. The works were being carried on at the several mines with the utmost vigour. Notwithstanding the directors have the utmost confidence in the ability and energy of Mr. Macdonald, their manager, as well as Mr. Rordam, their engineer, they were nevertheless anxious that a deputation from their number should visit the property, with the view to a thorough examination both as to the past and future management of the company's mines; and Mr. Bigg, having kindly consented so to act, visited the property accordingly, and during his stay there of 14 days, in August last, had every department of the undertaking brought under his notice; and that gentleman's report on the subject is very conclusive as to the valuable property belonging to the company, and also as to the ability and care which are being exercised in order to bring it into a profitable condition; and from the attention Mr. Bigg has given to the affairs of the company, the shareholders may rest assured he has used his best endeavours to arrive at a correct view of the property, and the mineral resources of the mines. As authorised by a special resolution, adopted on June 2, and confirmed on July 2, at an extraordinary general meeting of shareholders, the directors have allotted the bonus shares to various shareholders; upon which shares, as well as upon the original shares, a call of 1*s.* per share was made on Sept. 10 last.

The Secretary then read Mr. Bigg's report, which stated that the Sundse comprised two mines—the north and south. They were both now being worked, each occasionally producing silver; the yield from the South Sundse has latterly been quite equal to its expenses. The buildings appeared to be in all respects substantially erected, and well adapted to the purpose for which they were intended. With reference to the production of silver generally, it would be very difficult to form anything like a correct estimate, at the present time the yield being, as in all mining operations, variable according to circumstances; and he might mention as an instance, that at Neues Gluck Mine, which at one time was very promising, the yield had diminished, while, on the other hand, at South Sundse the mine (which was not thought so much of) was working more favourably. The attle heaps, though having been gone over already, were now being again turned, and the small stuff at the bottom of the heaps was considered to hold a sufficient quantity of silver to render it worth while going over it again, particularly as the expense attending the operation would be comparatively trifling. There was also a large heap of sand from the old workings of former times, which was left in its present state, for in those days "shaking tables," as now in use, were unknown, and hence it was supposed that a portion of silver yet remained, consequently it would be well worth re-working, though no certain calculation could be formed as to what it would produce until some portion of it had been gone over and tested by the aid of the "shaking tables." Mr. Bigg, in conclusion, stated that he was much pleased with the attentive way in which he was received by both Mr. Macdonald and Mr. Rordam, and their great readiness and desire to show and explain everything relating to the mining works, and he thought the shareholders had much reason to congratulate themselves upon having been able to secure two such good and efficient officers, who evidently took very strong interest in the work they had in hand.

Mr. Bigg said there were many points—valuable points—about the property. There was no doubt that a very large amount of silver could be obtained, but it was locked up in a very strong box, and one which it was very difficult to open. The rock in which the silver was deposited was very hard, for it took two men about one month to excavate one cubic fathom. Its hardness, however, varied, but the average expense of blasting and removing each cubic fathom might be put down at about 10*l.* Taking every expense, including that of rendering the silver marketable, the average of each cubic fathom might be put down at from 40*l.* to 50*l.* Now, it was difficult to estimate the value of the "scheiderts" till it had been crushed, but they had had about 100 lbs. weight per week, some of which Mr. Macdonald had estimated would yield as much as 10 per cent. of silver. The general mine expenses, exclusive of those incurred upon the works and buildings, had been about 50*l.* per week. He did not wish it to be inferred from these remarks that he had come to the conclusion that their operations would be unprofitable, for at present the development of the mines had not been sufficiently advanced to know with certainty what results could be realised. Shareholders must remember that it took one month to excavate a cubic fathom of rock, and that as the company's operations did not extend beyond two years, but comparatively little progress had yet been made. He could not, however, think that they would derive such enormous profits as they had been led to suppose. He had put himself to a great deal of trouble in endeavouring to ascertain the correctness of the statements which were promulgated at the initiation of the company with regard to the productiveness of the Norwegian Government mines. He held in his hand a book, which stated that the Government derived from its silver mines 850,000 per annum—if that was so, the statement which had been put before the shareholders was certainly incorrect, for, according to that, the Government derived an annual profit of 50,000*l.* But, notwithstanding all this, he felt satisfied that his co-shareholders might certainly expect a good return for their outlay.

Mr. Pelly (a director) said that the book referred to by his colleague was a translation only. There was no doubt in his (Mr. Pelly's) mind that the Norwegian Government derived from its mines an annual profit of 50,000*l.*

Mr. Lundt assured the meeting that the statements put forth at the inauguration of the company with regard to the annual profits of the King's mines were correct.

Mr. Bigg said if such could be proved to be the case it would be more satisfactory, both to himself as well as to all connected with the company.

Mr. Lundt said that the statement referred to he had personally obtained from the Norwegian Government.

The Chairman said he was not associated with the board at the commencement of the company, but upon looking at the Articles of Association he saw Mr. Bigg's name attached, and, therefore, if any misstatements had been published, he (the Chairman) could not help thinking that Mr. Bigg was as much to blame as anyone else.

Mr. Bigg said he had been twice to Norway, and he did not wish to lay before his co-proprietors anything that might afterwards be proved to be incorrect; but, at the same time, he did not wish it to be inferred that they would not be rewarded for their outlay. He felt satisfied that their managers would do their utmost for the benefit of the company, and although the Norwegian miners did not, perhaps, conduct their operations in a manner that would altogether please Englishmen, yet he certainly would not advocate that English miners should be employed, for he felt satisfied that it would bring about unsatisfactory results. Although the Norwegian miner was tractable enough, yet he was somewhat bigoted; for instance, he would not use such a thing as a wheelbarrow, preferring to carry the heavy produce from the mines in an implement somewhat resembling a butcher's tray; nor would he use such a thing as a pickaxe, crowbars being employed. While, however, all those things were much against Norwegian mining, yet the importation of English labour was out of the question.

The Chairman reminded the meeting that Mr. Bigg, in his estimate of the yield of silver, had included only that which would be produced from the "scheiderts;" but the produce from the "malm" ore was by no means inconsiderable. The value of the stuff at present upon the surface was estimated at 2000*l.* sterling. So satisfied was he (the Chairman) of the general prospects of the undertaking, that he had not only considerably increased his interest, but he was prepared to still further increase it.

Mr. Haddon, referring to the financial position of the company, fully believed that the accounts were fairly stated, but, at the same time, they did not show the assets and liabilities as required.

The Chairman said at present no actual profit had been realised, save a small amount obtained from the sum invested in Exchequer Bills, but he hoped at the next meeting there would be a regular profit and loss account, for before that time the stamps would be in regular working.

Mr. Haddon said that some time since allusion was made to the native silver having been found at every blast.

The Chairman said it was true that silver was found at every blast, but it was in the rock.

Mr. Bigg said in the neighbourhood of all these old mines there were immense heaps of attle, and that these were some years ago turned over, in which employment the head

mean at the company's establishment earned as much as 3*l.* per week. Underneath these heaps, which were in some places 3 or 4 feet deep, visible silver was to be found. Of course, the quantity would be very variable, but averaging the whole, he believed there was a large quantity of silver to be obtained.

Mr. HADDON said he had seen an assay made from some of the sand, which had yielded as much as 2½ grains of silver to the pound of sand. If that were a fair average, the whole mass might be estimated at the value of 32,963*l.*

A SHAREHOLDER complained that the manager's reports were not published.

The CHAIRMAN promised that in future the manager's reports should be sent to the *Mining Journal*.

Upon the proposition of the CHAIRMAN, seconded by Mr. HADDON, it was resolved that the report of the directors and the accounts be received and adopted, and that in future the accounts of the company be made up to Dec. 31, and that the ordinary meeting of the company be held in February.

Mr. MATTHEY suggested that the accounts of the company should be audited by a public accountant.—The CHAIRMAN said that the company was hardly in a position to require the services of a public accountant; and as the accounts were efficiently audited by two shareholders appointed at the general meetings, it was not desirable to increase at present the company's expenditure by the employment of professional auditors.

The retiring directors, Messrs. R. Wilson and A. Pelly were re-elected, and Messrs. Grant and Haddon were appointed auditors.

Votes of thanks were passed to Mr. Bagg and the Chairman, when the proceedings terminated.

CENTRAL AMERICAN MINING COMPANY.

The ordinary half-yearly meeting of proprietors was held at the offices of the company, Queen-street-place, on Thursday,—Mr. MACDONNELL in the chair.

Mr. J. PHILLIPS (the secretary) read the notice convening the meeting, and the minutes of the last were read and confirmed.

The report was read, from which the following is condensed:—

The expectations entertained by the directors, when they met the proprietors on April 30 last, have been realised. As then proposed, the first payment in liquidation of the first-class capital and interest was made on May 26, and there have since been two other payments, making altogether a distribution amongst the first-class shareholders of 8550*l.* The balance in the hands of the directors, after providing for all outstanding liabilities, amounts to about 2100*l.*, so that on the receipt of another remittance from Guatemala a fourth instalment may be paid to the first-class shareholders. The accounts which the directors continue to receive from Dr. Ellery are such as to encourage the expectation of being able to make other payments at moderate intervals. The privilege of exporting bullion was obtained from the Government of Guatemala by Dr. Ellery, on May 19 last, on his personal application. It permits the company to export in bars, free of duty for five years from Aug. 1, all silver produced from their mines over and above a fixed quantity of 1000 marcs per month, reserved for coinage at the mint. It also permits the importation of machinery and stores for the mines free of duty. The directors consider that great praise is due to Dr. Ellery for the manner in which he conducted this important transaction; in which also the directors recognise the liberal and enlightened policy manifested by the President and Government of Guatemala in all matters connected with the operations of this company. In consequence of this permission to export silver in bars, the rich ores which were previously sent to England are now reduced at the company's works, and the exportation of ore has for the present ceased. Returns of silver ore are now obtained from the mines of San Pantaleon and San Antonio, and the quantity during the past half-year would have been larger but for the scarcity of miners, caused by a deficient supply of corn, which compelled the people to go elsewhere in search of food; an evil which Dr. Ellery is very earnest in endeavouring to remedy. The results are favourable as regards the produce of silver and the expenses of working, and the directors doubt not that when the time arrives for holding the annual general meeting they will be enabled to present a satisfactory balance-sheet to the proprietors.

The CHAIRMAN said he had much pleasure in moving the adoption of the report just read, inasmuch as it showed that the company was not only in a satisfactory position, but that the prospects presented were of an exceedingly encouraging character.

Major HUMBY begged leave to second the adoption of the report, and suggested that as the productiveness of the mines was steadily improving the reducing power should be increased.

The CHAIRMAN said that if the produce of the mines continued to improve there was no doubt the reduction power must be increased.

Mr. JOHN TAYLOR, jun. (manager), said that the prospects, as well as the operations, of the company, had been somewhat changed from what they were some 18 months since. It was then contemplated to reduce the poor ores upon the spot, and to bring home all the rich ores; but now that the Government allowed them to export bullion free of duty, they would reduce all the rich ores and bring home bar silver, and the poorer ores would be reduced into more concentrated forms; and according to an estimate which Mr. Phillips had made, there appeared to be a decided saving by reducing upon the spot. The eight barrels now in operation were not more than equal to the present production of the mines, but it was to be remembered that the productiveness of the mines had increased during the past few months—in fact, the mines had improved very much more than had been anticipated. The water-wheel, which was at present driving these eight barrels, could be easily made to drive 12 barrels, which, of course, would give them a considerably increased reducing power; and if the mines for the next six months progressed as they had during the past year, it might become a serious question whether it would not be necessary to put up additional reducing power. But for the present it was contemplated to send out the necessary apparatus for attaching the four barrels to the existing machinery. As far as yet seen, the barrel amalgamation process was entirely successful. It was a great question in treating silver ores what was the best mode to treat them, and so far as they (the Messrs. Taylors) were concerned, they had a strong opinion in favour of barrels for ores of this description—there was less loss of quicksilver, and less consumption of salt, and the returns came out very satisfactorily indeed.

Major HUMBY had every confidence in the personal experience of the Messrs. Taylor in all matters pertaining to mining; and he would only throw out a suggestion that extra barrels should be supplied in the event of some of those in operation getting out of repair.

Mr. J. TAYLOR, jun., replied that the barrels themselves were made upon the spot; they were seldom injured, but when injured could be easily repaired. With regard to the mineral productiveness of the district in which the company's mines were situated, he might, perhaps, mention that some time since the whole of that country was explored by a very eminent mineralogist and geologist. Unfortunately, upon one of his return voyages his papers were lost; but he (Mr. Taylor) knew it was the opinion of this authority that there were several other veins in the vicinity of the company's property. The mines were provided with a steam-engine, and the quantity of work it had performed was something beyond credence. If it were thought advisable to apply steam for the purposes of reduction there was every facility for so doing, and any quantity of fuel could be obtained at moderate prices; so that, failing adequate water-power, they could easily employ steam-power to drive the barrels.

A DIRECTOR said that as eight barrels reduced 120 tons per month it might safely be reckoned that four more would reduce 180 tons, which was as much as the mines were likely to give for some time to come.

Mr. J. TAYLOR, jun., said the present was merely a conversational meeting, that the shareholders wished to have, and the executive were glad to convene, as it afforded them an opportunity of making known the position and prospects of the company, although it was not a meeting at which formally audited accounts were presented, yet he might inform proprietors that it appeared from the latest accounts that their operations for the past eight months had resulted in a nett profit of 5100*l.* Therefore, their position was improving month by month, and it was satisfactory to know that nothing was owing in that country or here. There was a remark in the report to which he wished to draw attention—he referred to the statement which alluded to the inconvenience the company had experienced from a scarcity of food. Some time since the directors, with a view to improve the company's position in that country, directed Dr. Ellery to purchase a quantity of land—some 1500 or 1600 acres—upon which stand the company's works. During the early part of the year all the necessaries of life had been at nearly famine prices, the result of which was that the working population would not come and accept the company's wages—that had been a serious difficulty, and, indeed, almost a matter of anxiety. Although he was not fond of a company like theirs undertaking farming operations, yet when they had such an efficient manager as Dr. Ellery, it would, perhaps, be worth while considering whether it would not be advisable to send out a man to act under Dr. Ellery as a sort of bailiff, so as to turn this land to the best possible account; or, in other words, the question was whether the company should not spend (say) 200*l.* per year in endeavouring to provide its *employés* with an ample supply of food and cattle. The climate was very favourable for the cultivation of vegetables, Indian corn, and grass.

Major HUMBY thought the question was one well worthy of consideration.

Mr. J. TAYLOR further stated that it might not be found necessary to send out an agriculturist, if Dr. Ellery could find in that country some one qualified to perform the duties. The whole matter was one which must be placed before Dr. Ellery, and by his decision they must abide; but, certainly, he (Mr. Taylor) did not think the company should possess that quantity of land without taking some means to prevent the recurrence of a scarcity of food.

The resolution, adopting the report, was then put and carried unanimously.

Mr. W. T. FAWCETT (Messrs. Hill, Fawcett, and Hill) thought the meeting would be neglecting an important duty if it separated without according its thanks to the Chairman and directors, not only for the successful manner in which they continued to conduct their affairs, but also for the comprehensive report they had just laid before the proprietors. It had been remarked by Mr. J. Taylor, jun., that the present was merely a conversational meeting, but he (Mr. Fawcett) must say that for the whole of the time the proprietors had been present the conversation had been of a most interesting character, showing that the satisfactory position of the company was surpassed only by the exceedingly encouraging prospects presented. There could not be a divided opinion upon the point that the report which had this day been presented was a most important document; and as at this semi-official meeting the directors had given so much gratifying information, the proprietors might well look forward to the annual meeting with an increased interest. With those few observations, he would conclude by moving a vote of thanks to the Chairman and directors and managers.

Mr. A. SCHOALES having seconded the proposition, it was put and carried.

The Chairman having acknowledged the vote, the proceedings terminated.

ROTATORY ENGINES.—Some improvements in rotatory engines have been provisionally specified by Mr. W. Voss, of Berlin. His invention relates to a peculiar construction and arrangement of rotatory engines, and consists in the employment of a pair of disc wheels, having a number of steam ports cast therein, each disc being fixed on a separate shaft of its own. In place of the two shafts being in the same axial line with each other, they are placed at an angle, so that one edge of the discs will be nearer together than the opposite edge. The steam ports or passages pass through the discs, and the corresponding ones in the inner faces of the two discs are connected by expansible bags or tubes of vulcanised India-rubber or other suitable material. A valve is so arranged as to admit the steam into each port successively as the discs revolve, the steam entering that port and bag or tube which is situate at the point where the edges of the discs are nearest together. As the steam expands this tube, it tends to rotate the discs, and bring the next succeeding port under the valve, which then receives steam in its turn, and so on, the exhaust taking place through the opposite disc, and at a point where the expansion of the tube is no longer of service. Motion is transmitted from these discs by having spur-teeth cast thereon, gearing into corresponding pinions on a second motion shaft. The bearings which support the shafts of the two disc wheels are made adjustable on their tables, so as to regulate exactly the angles of the two shafts.

FLEXIBLE VALVES.—Some improvements in the manufacture of flexible valves have been patented by Mr. Tuck, of Cannon-street. In constructing a circular or other form of valve, where the same is held by a spindle passing through it, a ring of metal, or of other strong material, is introduced into the interior or substance of the valve, around and concentric with the hole through which the spindle passes. In some cases near the outer circumference of the valve, and at a distance from the ring above mentioned, another ring of metal, or of other suitably strong material, is introduced into the substance of the valve, which ring may when desired be itself flexible, by being formed of links, or parts connected together, if of metal or other hard material, or the ring may be of flexible material, and in one piece. The invention is applicable whether woven fabrics are used in the construction or not.

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